UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/624,601	07/23/2003	Yuuichi Takenaka	HITA.0417	7628

38327 7590 12/01/2005

REED SMITH LLP
3110 FAIRVIEW PARK DRIVE, SUITE 1400
FALLS CHURCH, VA 22042

EXAMINER	
LUI, DONNA V	
ART UNIT	**PAPER NUMBER**
2675	

DATE MAILED: 12/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/624,601	TAKENAKA, YUUICHI	
	Examiner	Art Unit	
	Donna V. Lui	2675	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,7-10 and 12* is/are rejected.

7)☐ Claim(s) *2-6 and 11* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

3. Claim 1 is objected to because of the following informalities: Although applicant's claim 1 meets the requirement of 112/2nd, i.e. the metes and bound are determinable, grammatical errors are present in the wording of the claim and could be improved.

Claim 1, line 19, The phrase "in plane ... base sheet" would be better presented as: longitudinal direction in a plane of the base sheet, wherein the imperfect connection parts are formed at a portion of the sheet fiber member of the base sheet.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 1 and 7-8** are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (Patent No.: 6,738,123) in view of Vasoya et al. (Patent No.: 6,869,664).

With respect to **Claim 1**, Takahashi discloses a display device *(figure 1, 1)*. Takahashi teaches the display device comprising: an insulating substrate *(figure 2, 1b glass; column 4, lines 28-30)* which has a large number of electrodes *(column 4, line 55; 12)*, having an end periphery *(edge of 1b which is closest to element 3)* thereof on which a plurality of leads *(13; column 4, line 66 to column 5, line 4)* which supply signals for image display to the respective electrodes are formed; a multi-layered printed circuit board *(3, column 4, lines 31-32; note: the multi-layered PCB also comprises elements 4a, 17, 18, and 19)* which is arranged along the end periphery *(edge of 3 which is closest to element 1b)* and includes wiring *(4a)* for transmitting the signals for image display along the end periphery; and a plurality of printed circuit boards *(figure 1, 5)* for bridging which are arranged in parallel along the end periphery *(edges of 1b)* of the insulating substrate, wherein for every one of a plurality of groups of leads *(groups of leads correspond to the projection electrodes-13 of element 5)* formed by dividing the plurality of leads along the end periphery, each printed circuit board bridges the wiring of the multi-layered printed circuit board with one of the plurality of groups of leads *(see figure 1)*.

Takahashi does not teach the multi-layered printed circuit board (herein after referred to as "M-L PCB") to include at least a unit which has at least one base sheet which is formed by impregnating an insulating sheet fiber member with resin and conductive layers which are stacked and fixed to the base sheet and are insulated from each other by the base sheet. Nor does Takahashi teach imperfect connection parts which attenuate an elongation and a shrinkage of the

multi-layered printed circuit board in the longitudinal direction in a plane of the base sheet are formed at a portion of the sheet fiber member of the base sheet.

Vasoya discloses the structure of a printed circuit board. Vasoya teaches the multi-layered printed circuit board *(figure 10; 10"")* to include at least a unit *(elements 124 and 126)* which has at least one base sheet *(124)* which is formed by impregnating an insulating sheet fiber member *(column 3, line 54; 124)* with resin *(column 3, lines 57-59)* and conductive layers *(column 3, line 24; 126, metal layers)* which are stacked and fixed to the base sheet and are insulated from each other by the base sheet.

Vasoya teaches imperfect connection parts *(130, equivalently known as through holes or parts of the M-L PCB which are no longer "perfect")* which attenuate an elongation and a shrinkage of the M-L PCB in the longitudinal direction *(direction perpendicular to through holes)* in a plane of the base sheet *(since the base sheet is three dimensional, the plane was interpreted as the side of the base sheet flush to a sectional cut along the centers of the imperfect connections)*. Vasoya teaches the imperfect connection parts are formed at a portion of the sheet fiber member of the base sheet *(the imperfect connection parts are formed by removing portions of all layers of the M-L PCB, including some of the sheet fiber member)*. The terms "attenuate an elongation and a shrinkage" are so broad that it reads on two interpretations through Vasoya, as explained in the following. The first interpretation of attenuate elongation and shrinkage is due to the loss of composition of the M-L PCB due to the drilling of through holes *(column 11, lines 14-16; less of the M-L PCB is equivalent to shrinkage)*. The second interpretation is viewing the M-L PCB through a sectional view, where the viewed section is a cut taken along the centers of the imperfect connections *(through holes, see figure 10)*. By looking at figure 10, the total length

of the sides perpendicular to the imperfect connection parts is shorter than the measurement taken prior to the formation of through holes. This comparison shows that the M-L PCB has indeed shrunk in regards to a longitudinal direction.

It would have been obvious for a person of ordinary skill in the art at the time the invention was made to have used a M-L PCB comprising an insulating base sheet impregnated with resin with stacked conductive layers which are fixed to the base sheet and are insulated from each other by the base sheet that have imperfect connection parts in a plane of the base sheet, as taught by Vasoya, to the circuit board of Takahashi, for the purpose of enablement in a high performance printed circuit board *(column 2, lines 26-27)*, conducting heat away from the surface and improving the coefficient of thermal expansion CTE *(column 10, lines 58-60)*.

With respect to **Claim 7**, Takahashi teaches a display device wherein a semiconductor chip *(column 4, line 33; figure 2, 5)* is mounted on the printed circuit board *(3)* for bridging.

With respect to **Claim 8**, Takahashi teaches a display device wherein another insulating substrate *(figure 1a; column 4, lines 28-30)* is further arranged to face the insulating substrate *(1b)*, these insulating substrates have respective peripheries *(main surfaces of 1a and 1b which face each other)* thereof adhered to each other, and liquid crystal *(11)* is filled and sealed between the insulating substrate and another insulating substrate. Takahashi does not explicitly state the use of a sealing material. Official Notice is taken that the concept of adhering liquid crystal between two insulating substrates with sealing material are well known and expected in the art. It would have been obvious to have used sealing material to adhere the two insulating

substrates to each other in the display device of Takahashi for the purpose of securing the liquid crystal in between the two insulating substrates such that the liquid crystal does not leak out.

5. **Claims 9, 10 and 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi, in view of Vasoya, and in further view of Ehman et al. (Patent No.: 6,021,050).

With respect to **Claim 9**, the claim differs from claim 1 since claim 9 does not recite the limitation "imperfect connection parts which attenuate an elongation and shrinkage of the M-L PCB in the longitudinal direction in plane of the base sheet are formed at a portion of the sheet fiber member of the base sheet" and recites the limitation "a plurality of discontinued areas in the extending direction of the base sheet are formed in the insulating sheet fiber member."

Takahashi discloses a display device *(figure 1, 1)*. Takahashi teaches the display device to comprise an insulating substrate *(figure 2, 1b glass; column 4, lines 28-30)* which has a main surface *(side facing elements 1a and 5)* on which a plurality of electrodes *(column 4, line 55; 12)* contributing to an image display operation are formed, wherein a plurality of leads *(13; column 4, line 66 to column 5, line 4)* which supply signals to the plurality of respective electrodes are arranged in parallel *(see figure 1, arranged side by side)* along at least one side *(figure 1; side of edge 1b facing 3)* of the main surface of the insulating substrate; a multi-layered printed circuit board *(3, column 4, lines 31-32; note: the multi-layered PCB also comprises elements 4a, 17, 18, and 19)* which has wiring *(4a)* for transmitting the signals along at least one side of the main surface of the insulating substrate; and a plurality of printed circuit boards *(figure 1, 5)* which respectively bridge a distance between the multi-layered printed circuit board and at least one

side of the main surface of the insulating substrate, and supply the signal to at least one of groups of the plurality of leads *(groups of leads correspond to the projection electrodes-13 of element 5)* which are formed in a divided manner at least along one side of the main surface from the multi-layered printed circuit board *(see figure 1)*.

Takahashi does not teach the multi-layered printed circuit board having a laminated structure which includes at least a base sheet formed of an insulating sheet fiber member impregnated with resin and a conductive layer formed on the base sheet and insulated from the base sheet, the extension direction of the base sheet is arranged along at least one side of the main surface of the insulating substrate, and a plurality of discontinued areas in the extending direction of the base sheet are formed in the insulating sheet fiber member.

Vasoya discloses the structure of a printed circuit board. Vasoya teaches the multi-layered printed circuit board having a laminated structure *(figure 10, 10""; column 2, lines 22-24)* which includes at least a base sheet *(124)* formed of an insulating sheet fiber member impregnated with resin *(column 3, lines 57-59)* and a conductive layer *(column 3, line 24; 126, metal layers)* formed on the base sheet and insulated from the base sheet *(the conductive layer is insulated from the base sheet since the resin is impregnated onto the surface of the base sheet acting as an intermediate layer)*, the extension direction of the base sheet is arranged along at least one side of the main surface of the insulating substrate *(since the base sheet is a uniform layer throughout the M-L PCB and is three dimensional, it is therefore arranged along a side of the main surface of the insulating substrate)*.

It would have been obvious for a person of ordinary skill in the art at the time the invention was made to have used the M-L PCB having a laminated structure which includes an

insulating sheet fiber member impregnated with resin and a conductive layer formed on the insulating sheet where the extension of the base sheet is arranged along at least one side of the main surface of the insulating substrate, as taught by Vasoya, to the display device of Takahashi, for the purpose of enablement in a high performance printed circuit board *(column 2, lines 26-27)*, conducting heat away from the surface and improving the coefficient of thermal expansion CTE *(column 10, lines 58-60)*.

However both Takahashi and Vasoya do not teach a plurality of discontinued areas in the extending direction of the base sheet are formed in the insulating sheet fiber member.

Ehman discloses a printed circuit board structure *(figure 1, 10)*. Ehman teaches a plurality of discontinued areas *(figure 1, 56 – hole that is embodied by the multiple layers (14 and 16) and bonding layers (18 and 20))* in the extending direction of the base sheet are formed in the insulating sheet fiber member *(discontinued areas penetrate at least one of the insulating sheet fiber layers 12, 14, and 16, and since one or more discontinued areas may be formed through one or more of the layers of the M-L PCB (column 5, lines 46-48) the multiple discontinued areas may be punctured to extend along the direction of the base sheet)*.

It would have been obvious for a person of ordinary skill in the art at the time the invention was made to use a plurality of discontinued areas formed in the insulating sheet fiber member in the extending direction of the base sheet, as taught by Ehman, to the display device of Takahashi, as modified by, Vasoya, for the purpose of making electrical contacts between various circuits and components mounted on the surface of the printed circuit board *(column 5, lines 46-51)*.

With respect to **Claim 10**, note above discussion of Takahashi, Vasoya, and Ehman.

Takahashi teaches films made of resin extending along the extension direction of the base sheet, but does not teach resin formed on discontinued areas of the sheet fiber member in the base sheet of the M-L PCB.

Vasoya teaches films made of resin formed on the discontinued areas of the sheet fiber member *(column 11, lines 16-22)*.

It would have been obvious for a person of ordinary skill in the art at the time the invention was made to use the formation of films made of resin on the discontinued areas of the sheet fiber member, as taught by Vasoya to the display device of Takahashi, as modified by Vasoya and Ehman, for the purpose of ensuring electrical connections do not exist between layers of the printed circuit board *(column 11, lines 20-22)*.

With respect to **Claim 12**, Takahashi does not teach the sheet fiber member formed in the base sheet of the M-L PCB are not completely separated along the extending direction of the base sheet in the discontinued areas.

Vasoya teaches the sheet fiber member formed in the base sheet *(124)* of the M-L PCB are not completely separated along the extending direction of the base sheet in the discontinued areas *(the sheet fiber member formed in the base sheet is only partially separated in the sense that through holes which are equivalent to discontinued areas are formed throughout the M-L PCB and do not completely separate a portion of the M-L PCB from another portion)*.

It would have been obvious for a person of ordinary skill in the art at the time the invention was made to use the sheet fiber member formed in the base sheet of the M-L PCB

which are not completely separated along the extending direction of the base sheet in the discontinued areas, as taught by Vasoya, to the display device of Takahashi, as modified by Vasoya and Ehman, for the purpose of making electrical contacts between various circuits and components mounted on the surface of the printed circuit board *(column 5, lines 46-51)*.

Allowable Subject Matter

6. Claims 2-6 and 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

With respect to **Claim 2**, reference Takahashi discloses a display device and reference Vasoya teaches the use of imperfect connection parts. None of the prior art teaches the imperfect connection parts extend between the printed circuit boards for bridging in the direction which connects end peripheries of the printed circuit boards for bridging along the widthwise direction.

With respect to **Claim 3**, reference Takahashi discloses a display device and reference Lee et al. (Patent No: 6,954,985) teaches the imperfect connection parts are constituted of an imperfect connection parts *(M-L PCB is no longer "perfect")* of a first row *(figure 4, 1c – upper section)* which are intermittently arranged in the longitudinal direction *(placed on either top or bottom of M-L PCB and not on the sides of figure 4)* of the multi-layered printed circuit board and imperfect connection parts of a second row *(1c – lower section)* which are intermittently arranged in the longitudinal direction of the multi-layered printed circuit board. None of the prior

art teaches the imperfect connection parts of the first row are formed between arrangements of the printed circuit boards for bridging and the imperfect connection parts of the second row are formed at positions where the printed circuit boards for bridging are overlapped to the multi-layered printed circuit board.

With respect to **Claim 11**, reference Takahashi discloses a display device. None of the prior art teaches the discontinued areas of the sheet fiber member which are formed in the base sheet of the multi-layered printed circuit board extend in the direction which traverses the extending direction of the base sheet so as to divide the sheet fiber member into sections.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Lee et al. (Patent No.: 6,954,985) is cited to teach imperfect connection parts are constituted of an imperfect connection parts of a first row which are intermittently arranged in the longitudinal direction of the multi-layered printed circuit board and imperfect connection parts of a second row which are intermittently arranged in the longitudinal direction of the multi-layered printed circuit board.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donna V. Lui whose telephone number is (571) 272-4920. The examiner can normally be reached on Monday through Friday 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sumati Lefkowitz can be reached on (571) 272-3638. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DL

Donna V Lui
Examiner
Art Unit 2675

SUMATI LEFKOWITZ
SUPERVISORY PATENT EXAMINER